CLAIMS

[1] A control signal generating circuit for a switching regulator, the control signal generating circuit comprising:

a comparator that compares a voltage based on an output voltage of the switching regulator with a reference voltage;

a flipflop that is set with an output of the comparator; and

a pulse control circuit that resets the flipflop when a predetermined on-period elapses after a rise of an output pulse of the flipflop,

wherein the control signal generating circuit outputs the output pulse of the flipflop as a control signal for a switching device.

[2] The control signal generating circuit of claim 1, wherein

the pulse control circuit comprises an on-period setting comparator that compares with a second reference voltage a voltage corresponding both to a period elapsed after the rise of the output pulse of the flipflop and to an input voltage of the switching regulator, and

the on-period is set by resetting the flipflop with an output of the on-period setting comparator.

[3] The control signal generating circuit of claim 1, further comprising a maximum on-period control circuit that sets a maximum on-period and that resets the flipflop when the maximum on-period elapses after the rise of the output pulse of the flipflop,

wherein the on-period of the output pulse of the flipflop is limited so as not to exceed the maximum on-period.

[4] The control signal generating circuit of claim 2, further comprising a

maximum on-period control circuit that sets a maximum on-period and that resets the flipflop when the maximum on-period elapses after the rise of the output pulse of the flipflop,

wherein the on-period of the output pulse of the flipflop is limited so as not to exceed the maximum on-period.

[5] The control signal generating circuit of claim 3, further comprising a reset-preventing section that prevents an output of the pulse control circuit from resetting the flipflop if, when the predetermined on-period has elapsed after the rise of the output pulse of the flipflop, the voltage based on the output voltage of the switching regulator is lower than the reference voltage.

[6] The control signal generating circuit of claim 4, further comprising a reset-preventing section that prevents an output of the pulse control circuit from resetting the flipflop if, when the predetermined on-period has elapsed after the rise of the output pulse of the flipflop, the voltage based on the output voltage of the switching regulator is lower than the reference voltage.

[7] The control signal generating circuit of claim 5, further comprising a set-preventing section that prevents an output of the comparator from setting the flipflop after the maximum on-period has elapsed after the rise of the output pulse of the flipflop until a predetermined period further elapses.

[8] The control signal generating circuit of claim 6, further comprising a set-preventing section that prevents an output of the comparator from setting the flipflop after the maximum on-period has elapsed after the rise of the output pulse of the flipflop until a predetermined period further elapses.

[9] A switching regulator comprising:

a DC-DC converter;

a control signal generating circuit that generates a control signal corresponding to an output voltage of the DC-DC converter; and

a driver circuit that drives a switching device included in the DC-DC converter based on the control signal,

wherein

the control signal generating circuit comprises:

a comparator that compares a voltage based on an output voltage of the switching regulator with a reference voltage;

a flipflop that is set with an output of the comparator; and

a pulse control circuit that resets the flipflop when a predetermined on-period elapses after a rise of an output pulse of the flipflop,

wherein the control signal generating circuit outputs the output pulse of the flipflop as a control signal for the switching device.

[10] The switching regulator of claim 9, wherein

the pulse control circuit comprises an on-period setting comparator that compares with a second reference voltage a voltage corresponding both to a period elapsed after the rise of the output pulse of the flipflop and to an input voltage of the switching regulator, and

the on-period is set by resetting the flipflop with an output of the on-period setting comparator.

[11] The switching regulator of claim 9, wherein the control signal generating circuit further comprises a maximum on-period control circuit that sets a maximum on-period and that resets the flipflop when the

maximum on-period elapses after the rise of the output pulse of the flipflop,

wherein the on-period of the output pulse of the flipflop is limited so as not to exceed the maximum on-period.

[12] The switching regulator of claim 10, wherein the control signal generating circuit further comprises a maximum on-period control circuit that sets a maximum on-period and that resets the flipflop when the maximum on-period elapses after the rise of the output pulse of the flipflop,

wherein the on-period of the output pulse of the flipflop is limited so as not to exceed the maximum on-period.

[13] The switching regulator of claim 11, wherein the control signal generating circuit further comprises a reset-preventing section that prevents an output of the pulse control circuit from resetting the flipflop if, when the predetermined on-period has elapsed after the rise of the output pulse of the flipflop, the voltage based on the output voltage of the switching regulator is lower than the reference voltage.

[14] The switching regulator of claim 12, wherein the control signal generating circuit further comprises a reset-preventing section that prevents an output of the pulse control circuit from resetting the flipflop if, when the predetermined on-period has elapsed after the rise of the output pulse of the flipflop, the voltage based on the output voltage of the switching regulator is lower than the reference voltage.

[15] The switching regulator of claim 13, wherein the control signal generating circuit further comprises a set-preventing section that prevents an output of the comparator from setting the flipflop after the maximum on-

period has elapsed after the rise of the output pulse of the flipflop until a predetermined period further elapses.

[16] The switching regulator of claim 14, wherein the control signal generating circuit further comprises a set-preventing section that prevents an output of the comparator from setting the flipflop after the maximum on-period has elapsed after the rise of the output pulse of the flipflop until a predetermined period further elapses.

[17] The switching regulator of claim 9, further comprising a resistor between the comparator and an output capacitor included in the DC-DC converter.

[18] The switching regulator of claim 9, wherein the reference voltage varies with the output pulse of the flipflop, and is in substantially opposite phase to the output voltage of the switching regulator.

[19] The switching regulator of claim 18, wherein

the driver circuit comprises an output terminal via which a signal based on an inverted signal of the control signal is outputted,

the switching regulator further comprises a constant voltage source and a resistor that has one end thereof connected to the output terminal of the driver circuit via which the signal based on the inverted signal of the control signal is outputted and that has another end thereof connected to an output terminal of the constant voltage source, and

a voltage at a node between the constant voltage source and the resistor is the reference voltage.

[20] The switching regulator of claim 18, further comprising a constant

voltage source and a resistor that has one end thereof connected to an inverting output terminal of the flipflop and that has another end thereof connected to an output terminal of the constant voltage source,

wherein a voltage at a node between the constant voltage source and the resistor is the reference voltage.

[21] The switching regulator of claim 18, further comprising a constant voltage source, a variable current source that varies a current according to a signal based on the control signal, and a resistor that has one end thereof connected to the constant voltage source and that has another end thereof connected to the variable current source,

wherein a voltage at node between the resistor and the variable current source is the reference voltage.